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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,445	06/13/2001	Yoshijiro Ushio	4641-59261	7027

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EXAMINER	
BERRY, RENEE R	

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 10/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AJC

Office Action Summary	Application No. 09/881,445	Applicant(s) Ushio et al.
	Examiner Renee Berry	Art Unit 2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *10 and 12-26* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *10 and 12-26* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 10 and 12-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent no. 5,433,651 to Lustig et al. in view of US patent no. 5,949,927 to Tang

In regard to claim 10, Lustig teaches in a process for progressively reducing a thickness of a thin-film layer on a surface of a substrate a method for detecting a process endpoint representing a minimum desired thickness of the thin-film layer by (d) calculating a cross-correlation function of the spectral-characteristic signal with a reference spectral-characteristic signal, the cross-correlation function exhibiting a change with a corresponding change in the thickness of the thin-film layer; and (e) from the cross-correlation function, determining the process endpoint at column 12, lines 28-44, claim 8.

In regard to claim 17, Lustig teaches providing a reference value of the parameter corresponding to a reference thickness of the thin-film layer; comparing the thickness determined in step (d) with the reference value to obtain a comparison value; calculating from the comparison

value, a process endpoint at which to cease reducing the thickness of the thin-film layer at column 13, lines 40-46.

In regard to claim 18, Lustig teaches the step of specifying on the thin-film layer a measurement position that includes the location and step (a) is performed at the measurement position at column 7, lines 51-60.

In regard to claim 19, Lustig teaches providing a reference value of the parameter corresponding to a reference thickness of the thin-film layer at the measurement position; comparing the thickness determined in step (d) with the reference value to obtain a comparison value; calculating from the comparison value, a process endpoint at which to cease reducing the thickness of the thin-film layer at column 5, lines 1-11.

In regard to claim 20, Lustig teaches providing a reference value of the parameter corresponding to a reference thickness of the thin-film layer at the measurement position; comparing the thickness determined in step (d) with the reference value to determine an actual thickness of the thin-film layer at the measurement position; and calculating from the actual thickness a process endpoint at which to cease reducing the thickness of the thin-film layer at column 5, lines 1-11.

In regard to claim 21, Lustig teaches obtaining an optical signal from a desired measurement position on the surface of the workpiece; calculating a thickness of the thin-film layer; and comparing the calculated thickness with a reference thickness at the measurement

position so as to determine a process endpoint at which to cease reducing the thickness of the thin-film layer at column 7, lines 33-50.

In regard to claim 22, Lustig teaches the workpiece is a semiconductor wafer and the thin-film layer is either a metal layer or an insulating layer on the surface of the wafer at column 5, lines 35-36.

In regard to claim 23, Lustig teaches in a process for reducing a thickness of a thin-film layer on an integrated circuit device formed on a surface of a semiconductor wafer, a method for detecting the thickness of the thin-film layer by (a) directing a probe light to a location on the thin-film layer so as to produce a signal light propagating from the location, the signal light produced by either reflection of probe light from the thin-film layer or transmission of probe light through the thin-film layer; (b) removing all orders of diffracted light from the signal light except a zeroth order of diffracted light; (c)producing a signal waveform from the zeroth-order signal light; (d) calculating a value of a parameter of the signal waveform; and (e) from the value obtained in step (d) calculating a thickness of the thin-film layer at column 12, lines 28-44, claim 8.

In regard to claim 24, Lustig teaches step (b) is performed by passing the signal light from the location through an aperture defined by an aperture plate, the aperture plate being configured and situated so as to block higher orders of diffracted light in the signal light at column 12, lines 3-10, claim 4ii.

In regard to claim 25, Lustig teaches the step of varying a size of the aperture so as to cause the aperture to pass only the signal light at column 7, lines 14-25.

In regard to claim 26, Lustig teaches step (b) is performed by providing a two-dimensionally distributed measurement of a spot pattern of the signal light while blocking the higher orders of signal light at column 12, lines 11-17, claim 5.

However, Lustig does not teach all the limitations of the claims.

In regard to claims 1 and 12, Tang in a process for reducing a thickness of a thin-film layer on a surface of a workpiece a method for detecting the thickness of the thin-film layer by (a) directing a probe light to a location on the thin-film layer so as to produce a signal light propagating from the location; (b) producing a signal waveform from the signal light; (c)calculating a value obtained in step (c), calculating a thickness of the thin film layer at column 5, lines 6-15 and column 6, lines 49-56.

In regard to claim 13, Tang teaches the parameter is selected from the group consisting of a difference between a largest local maximum of the signal waveform and a smallest local minimum of the signal waveform at column 6, lines 45-53.

In regard to claim 15, Tang teaches the parameter is a quotient of the smallest local minimum of the signal waveform to the largest local maximum of the signal waveform at column 5, lines 6-16.

In regard to claim 16, Tang teaches the parameter is an average of the signal waveform at column 5, lines 6-16.

In regard to claim 14, Tang teaches the parameter is the smallest local minimum of the signal waveform at column 5, lines 6-16.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified Lustig to include detecting the thickness of the thin-film layer by (a) directing a probe light to a location on the thin-film layer so as to produce a signal light propagating from the location; (b) producing a signal waveform from the signal light; (c)calculating a value obtained in step (c), calculating a thickness of the thin film layer; and the parameter is selected from the group consisting of a difference between a largest local minimum/maximum of the signal waveform and a smallest local minimum of the signal waveform, since such a modification would result in accurate endpoint detection, as described in column 2, lines 60-64 of Tang.

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to R. R. Berry whose telephone number is (703) 305-4544.

HOAI HO
PRIMARY EXAMINER

RRB

September 24, 2003